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On the cover – January/February 2022

Editor's Word



2022's magnet for care

I feel sorry for the humble bill-of-materials. What is it other than a table full of semi-unintelligible information? Nothing could be further from the truth; a manufacturing company's portfolio of bills-of-materials actually represents its beating heart. Just like a human heart, the health and welfare of every BoM needs to be front and centre.

It's easy to see why a BoM can get lost in the system. The problem is deciding who owns it: design, purchasing, manufacturing, accounts, QA? The answer is every BoM should be under joint ownership, all of the time.

If love, care and attention is lavished on a BoM throughout its life it can be allowed to evolve in a way that advances the role of every department. Naturally, there needs to be limits. I'm not encouraging mission creep or unnecessary change requests. In an ideal situation, regular care and attention hopefully results in no changes through a BoM's life provided it was well engineered in the first place.

However, if the past 2-years teaches us anything it's that the electronics industry is never in an ideal situation, it just swings from slightly to very unideal. Whether change comes in the form of the steady evolution of technology, moving customer expectations or the hammer blow of a global pandemic, every BoM is under pressure, all the time.

Make your BoMs your magnets of care for 2022. If you haven't already done so, build software applications that allow you to care for your BoMs without overburdening your existing processes. It's an upfront effort that fuels long term benefits for all.

Jon Barrett

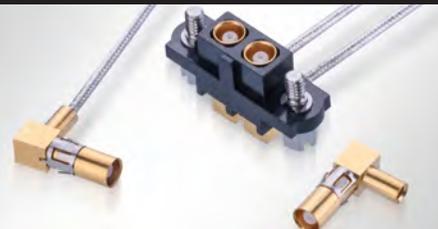
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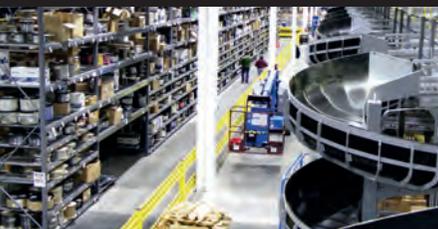
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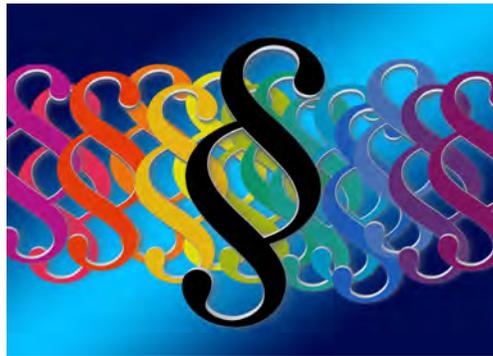
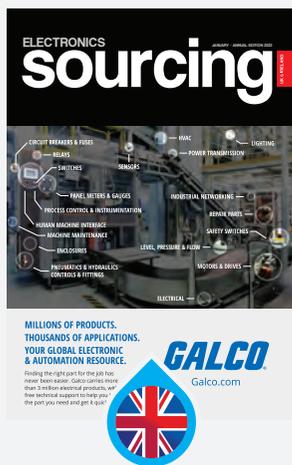
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New RoHS standard for documentation

The European standard DIN EN 50581:2012 has been replaced with the harmonized standard EN IEC 63000:2018, as of 18 November 2021. This supports the RoHS Directive 2011/65/EU on the restriction of certain hazardous substances in electrical and electronic equipment. As the FBDi explains, even though the content of this standard remains largely unchanged from its predecessor, manufacturers must now update their CE declarations of conformity.

The objective of the new standard is to harmonize legislation to ensure uniform assessment. It defines the documentation that a manufacturer must prepare for the assessment of electrical and electronic equipment to comply with substance restrictions in the RoHS Directive. As such, the new IEC 63000 standard describes the transfer of technical ingredient declarations within the supply chain and can also help demonstrate compliance with other regulations including REACH (EC) No. 1907/2006 and POP- (EU) 2019/1021.

The FBDi has also released news on the RoHS exemptions review. Currently, many companies are waiting for information on the extension of various exemptions that expired on July 21, 2021. Because applications for extension were submitted in due time, the exemptions will remain in place until the EU Commission has completed its assessment and announced a decision. The FBDi expects a decision will not be made until the beginning of 2022.

www.fbd.de



New source for SOM solutions

System-on-module expert, MicroSys Electronics has signed an agreement with EBV Elektronik, expanding its reach across the EMEA region. The agreement will provide enhanced product access and engineering advice for the company's myriad SoMs, single board computers and custom specific systems based on the latest NXP processors. Applications for MicroSys' products include automation, avionics, automotive, medical, rail and transportation, construction, and mobile machines.

Managing director of MicroSys, Ina Schindler, commented: "We have a reputation for helping to shorten design cycles so that customers can accelerate time-to-market. With this channel agreement, we will gain greater traction throughout EMEA, providing the high level of attention that customers deserve."

Director for high-end processing at EBV Elektronik, Ulrich Schmidt, added: "We see huge untapped potential here for MicroSys' board-level technology and engineering know-how. This agreement will assist our customers in finding the best SoM or SBC solution for their application."

www.microsys.de

Pent-up demand will fuel growth in 2022

Supply chain disruption has resulted in unfilled pent-up demand that should help carry growth into the first half of 2022, according to the IPC's December Economic Outlook. Although it has lowered its forecast, it continues to predict that 2022 should be 'historically strong'.

There is capacity to buy among both consumers and businesses, the IPC states, but supply chain constraints have limited potential growth in spending and investment. Manufacturers report strong order growth, however this is offset by

higher costs and as a result profit margins are declining.

In a further industry report covering the Sentiment of the Global Electronics Manufacturing Supply Chain, the IPC records material and labour costs as the two largest issues facing the electronics supply chain. Inventory and transportation constraints also continue as a major impediment to growth.

ipc.org



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In Brief

Industrial haptic displays

Distec has partnered with haptic innovation company, Tanvas, to offer industrial touch monitors with software-defined tactile textures and haptic effects. The resulting touchscreens have no moving parts yet facilitate effects that can be felt with the swipe of a finger. The technology will be available on Distec's POS-PRO monitors and panel PCs from February 2022 for applications such as automotive, home automation and commercial displays.

www.distec.de/en/

Growth despite bottlenecks

FBDi reports that German component distribution has grown by 25.2 per cent in Q3 2021. Incoming orders set a record with an increase of 135 per cent. Industry remains concerned about the component shortage, but considering the year as a whole, the electronics components distribution industry is expected to return to pre-Corona turn-over levels.

www.fbd.de

E-mobility production in Poland

Phoenix Contact has opened a new e-mobility production facility in Poland. Built to meet rapidly growing demand for e-vehicles, the 15,000m² factory was built in five months. It currently manufactures AC charging cables, infrastructure charging sockets for AC charging stations and home chargers, as well as vehicle charging inlets for supply to the European and American markets.

www.phoenixcontact.com

New products from stock

Würth Elektronik has launched its latest brochure, available for download or in printed form. The catalogue presents new products and provides a portfolio overview. All new products are available from stock with no minimum order quantity. Highlights include filters, inductors, transformers, antennas, and optoelectronic components with product overviews for EMC components, capacitors, and thermal management.

www.we-online.com

Extensive battery choice

Rutronik is now offering Adam Tech's range of battery holders, battery snappers and mobile battery connectors. The series is manufactured in a range of connection variants, such as PCB leads with through-hole, SMT leads, wire leads and solder lugs.

The holders allow the attachment of various battery series and sizes including AAA, AA, C, D, 9V and lithium button cells from 12 to 24mm. Additional flexibility is provided by mounting at various heights.

Constructed from UL-94V0 or UL-94HB material with spring steel contacts, the holders are said to be efficient under both normal and demanding environmental conditions. Customised lead lengths and wire configurations are available.

www.rutronik24.com



Find single pair Ethernet solutions online

Mouser Electronics has introduced a new solutions page dedicated to single pair Ethernet (SPE) technology. Developed in collaboration with Analog Devices, Würth Elektronik, and Harting, the site features valuable insights on how to deliver Ethernet connectivity to the edge.

Alongside content including a technical article, video, and webinar, the site also offers convenient product information for 10BASE-T1L SPE solutions from Analog Devices, Würth Elektronik, and Harting.

The new SPE solutions page has been developed in response to the growth of smart factories and the industrial internet of things, which has led to the need for robust connectivity on the factory floor. Ethernet is the leading architecture for large-scale industrial connectivity, with SPE technology delivering high-performance data and power transmission through a single-wire pair to field-level actuator devices and sensors.

To find out more about the technology and the solutions available from Mouser, visit the new SPE solutions page at <https://eng.info.mouser.com/adi-wurth-harting-single-pair-ethernet>.

www.mouser.com



Supplier cuts lead times for automotive memory

Alliance Memory has reduced lead times for its DRAM and Micron Technology NOR Flash memory devices with automotive temperature ratings. The company now holds 70 parts in finished goods stock, with lead times of just six weeks for its most popular automotive temperature range products.

A variety of CMOS SDRAMs are available, including DDR1, DDR2, DDR3/L, LPDDR4, and LPDDR4X devices, with automotive temperature ratings of -40 to 105°C.

Micron NOR Flash memory products include two, four, eight, and 16Mb 5V parallel NOR devices from the M29F series, and 32 and 64Mb serial NOR components from the N25Q series. Parts are offered with temperature ratings of -40 to 85°C and -40 to 125°C in a variety of package options.

Potential applications for these AEC-Q100-compliant products include advanced driving assistance systems; powertrain; automotive active safety and autonomous driving; in-vehicle-networking; customized in-car PCs; telematics; and infotainment systems.

www.alliancememory.com

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Maintaining long-life industrial communications networks

Rochester Electronics' technical sales manager, Ken Greenwood, discusses support for legacy serial fieldbus protocols and industrial drives

Successful industrial automation networks have always demanded the fastest, most reliable communication network to seamlessly link together all elements of a factory system. Historically, industrial communications were created around a large number of customer-specific serial-based interfaces, which eventually became standards and protocols such as PROFIBUS, CANbus, Modbus and CC-Link.

While today's Ethernet-based solutions (PROFINET, EtherCAT and EtherNet/IP) provide a common, faster and more cost-effective solution to industrial communications, installed serial-based networks continue to require long-term support, as do older serial-based physical interfaces such as RS422, RS485 and RS232. If it's not broken, don't fix it.

Both the end customer and equipment OEM might have reasons to maintain the status-quo until performance benefits provide an overriding justification to upgrade the whole network.

- If the current system provides end customers with the performance they need, any forced investment and re-qualification costs will be unwelcomed
- Incumbent equipment manufacturers risk opening new tender processes if existing systems cannot be maintained

It seems counterintuitive, but there are significant reasons to avoid major system upgrades and to provide extended in-service support.

Semiconductors are core to any industrial communication

network. From the outlying sensor network to the programmable logic controllers (PLC) and drive controls, semiconductors form the main building blocks. Their ongoing availability is key to providing long-term system support.

Unfortunately, semiconductor lifecycles continue to shrink. Semiconductor product discontinuations rose by 19 per cent in 2020 driven by factors such as:

- Market consolidation continued driving product rationalisation or, in some cases, changing the dynamics of third-party fab arrangements
- Wafer capacity for fabless semiconductor companies was squeezed as the increase in home networking and internet connectivity consumed fab capacity. Investment and focus of global wafer fab companies followed the market and older nodes (110nm, 45nm) were discontinued

Component discontinuations force customers to commit to a traditional last-time-buy where finished components are purchased to cover all future needs. As well as tying up capital in stock, there are additional costs for specialised IC storage. Under perfect conditions, these costs are unwelcomed though manageable. Then, what happens if market needs increase or in-service maintenance timescales are extended?

It is a common misconception that after a component is discontinued, only the non-authorized network can help.

Nothing could be further from the truth

Sourcing through non-authorized routes, carries huge risks. Active component shortages and ongoing need for obsolete components provide additional incentives for gray market, poor quality or counterfeits to enter into the market.

These risks are exacerbated because most industrial communications' semiconductors need to:

- Perform over a wider temperature range
- Be guaranteed secure from intrusion (malware susceptibility of non-authorized components)
- Perform in a harsh external environment of electrical noise, vibration and contamination so commanding a price premium—thus attracting more unwelcome attention from counterfeiters

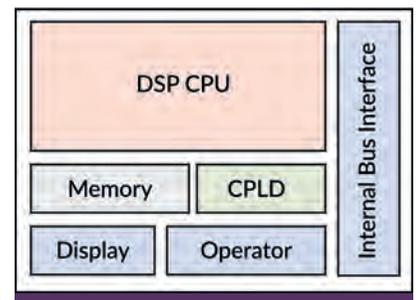
Authorized after-market distributors and manufacturers, such as Rochester Electronics, provide a risk-free long-term source for key semiconductors within industrial communications networks. They are an authorized partner supporting:

- Available stock to overcome market shortages or long lead-times
- A trusted source for obsolete parts off-the-shelf
- Long-term manufacturing from wafer of selected semiconductor product ranges

www.rocelec.com



Rochester Electronics' technical sales manager, Ken Greenwood



Key IC elements within control block



Component discontinuations force customers to commit to a traditional last-time-buy where finished components are purchased to cover all future needs



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Sourcing genuine components in a turbulent market

Mouser Electronics' technical marketing manager EMEA, Mark Patrick, discusses the value of authorised distribution

In the current market, buyers frustrated by interruptions to their supply chain may resort to sourcing components from unfamiliar distribution sources. However, this decision is fraught with risk because some unauthorised distributors choose to source their components from the 'grey market'. The provenance of such parts is often unknown, meaning their authenticity cannot be determined. It can be difficult to distinguish a counterfeit component from the genuine part because they are deliberately packaged to appear identical—featuring the same manufacturer branding and part number. Determining if a part is fake or genuine can only be done by carefully examining the package's internals, a task requiring an x-ray machine and specific testing skills.

A major concern associated with counterfeit components is the high probability they have not undergone the same rigorous testing and quality control procedures as genuine parts. This means they are more likely to exhibit inferior performance or even fail in the field. Engineers who use counterfeit components could be exposed to legal actions relating to product faults.

With chip shortages projected to continue into 2022, individuals and OEMs are advised to only source components from authorised

distributors with systems for tracing components back to the point of manufacture. This is especially important for components intended for use in medical/aerospace applications, which must have relevant documents and certification.

Mouser Electronics was the industry's first authorised distributor with AS6496 accreditation, the aerospace industry's high standard for anti-counterfeit measures in authorised electronic component distribution.

The AS6496 standard sets requirements for the avoidance, detection, mitigation and disposition of counterfeit products in the authorised distribution supply chain. This international standard requires authorised distributors to have a counterfeit mitigation policy and a counterfeit electronics parts control plan. AS6496 is geared for all industries and individuals looking to reduce the risk of counterfeit electronic parts entering the supply chain.

Mouser is also registered to AS9100D, ISO 9001:2015 and ANSI/ESD S20.20-2014, the industry's gold standards for quality, control and electrostatic discharge (ESD). Registration to these standards lets customers know Mouser is an authorised distributor of the highest quality components by providing traceability, risk management, process

control, customer support, product availability and document control.

Mouser has rigorous processes in place to prevent counterfeit products entering its supply chain, so customers can be confident that the components they purchase are genuine. In addition to product integrity, Mouser also assists its customers through real-time stock updates and obsolescence management, plus offers a variety of technical tools and resources to assist designers and buyers.

eu.mouser.com/quality/

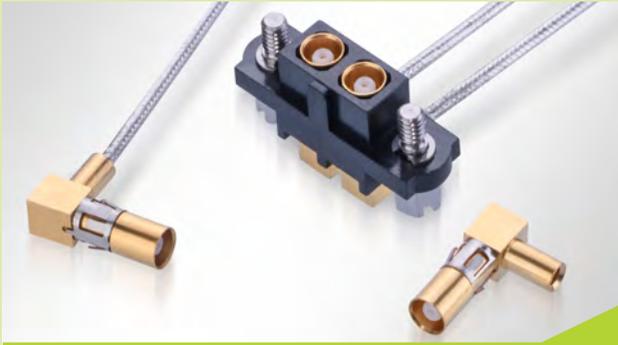


Mouser Electronics' technical marketing manager for EMEA, **Mark Patrick**



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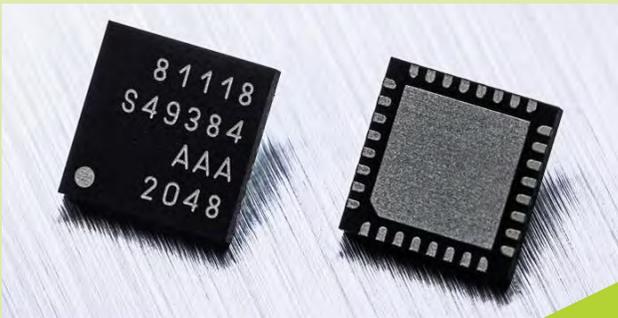
Source female contacts separately

Harwin has added a female contact to its Datamate Mix-Tek range, further ensuring that different elements of the range can be sourced separately.

Like all Mix-Tek coax contacts, the M80-310 is designed for carrying data, with support for frequencies reaching up to 6GHz. The latest contact can be fitted with a 1.19mm diameter semi-rigid coaxial cable. The 90 deg orientation is ideal for situations where built-in shielding and tight routing are required in applications such as robots, industrial equipment, military/aerospace hardware and satellites/ CubeSats.

M80-310 contacts are suitable for use with the complete range of Mix-Tek high-reliability housing types, from two to 12 position versions. These housings come with a variety of jackscrew styles to ensure mated connections capable of resisting up to 10G vibration and 100G shock. They are also compatible with all existing male coax contacts in the Mix-Tek portfolio, giving a 50 ohm impedance connection. Gold plated contacts and outer shell ensure these contacts can withstand a minimum of 500 mating cycles.

www.harwin.com



Controllers simplify automotive lighting

Melexis has extended its LIN RGB LED controller family by introducing the multi-channel MLX81118 for ambient and animated lighting within a LIN ecosystem. With 24 outputs, each capable of sourcing up to 60mA, the MLX81118 can drive eight RGB channels, reducing the bill of materials in automotive applications. Independent PWM control, configurable up to 16-bit resolution, allows the controller to achieve any colour point and brightness.

The MLX81118 is ideal for applications such as door trim or dashboards where multiple RGB LEDs need to be controlled via one LIN node within one or several modules. Multi-channel support means it is also suitable for light animations controlled via LIN.

LIN product line manager at Melexis, Michael Bender, said: "The MLX81118 enables trend-setting styles by providing flexible control for creative effects, to add personalisation and enhance safety."

www.melexis.com

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Chip market growth will slow in 2022

Demand for integrated circuits and discretives will weaken in 2022 resulting in more stable pricing and slower revenue growth



James Carbone

The global semiconductor market will grow 8.8 per cent to \$601 billion in 2022 after rising more than 25 per cent in 2021, according to World Semiconductor Trade Statistics.

Despite supply chain challenges caused by the Covid-19 pandemic, worldwide chip sales were expected to end 2021 increasing to \$552.9 billion after growing 6.8 per cent in 2020. The 2021 growth rate was the strongest growth rate for the semiconductor industry since 2010 when revenue increased 31.8 per cent, according to WSTS.

Strong demand for consumer electronic products, including computers, tablets and smart phones among other devices, drove all semiconductor categories to double-digit growth rates, except optoelectronics in 2021. Memory ICs, including DRAM and flash memory, had the strongest growth rate. Memory chip sales rose 34.6 per cent

to \$158 billion. Analog chip sales increased 30.9 per cent to \$72.8 billion and logic revenue rose with 27.3 percent to \$150.7 billion, WSTS said.

Chip sales in the Americas were expected to end 2021 growing 24.6 per cent, while sales in Asia would increase 26.7 per cent and chip revenue in Europe would rise 25.6 per cent, according to WSTS.

The bad news for chipmakers is semiconductor demand and revenue will cool in 2022 and price increases will lessen, according to industry analysts. More capacity is coming online which will help alleviate long lead times for some semiconductors and help stabilize prices. Overall, integrated circuit prices will increase 1 per cent in 2022 after increasing 3 per cent on average in 2021, according to IC Insights.

Move towards balance
Brian Matas, vice president

of market research for IC Insights, said semiconductor supply and demand will move toward being in balance next year at least for chips used in certain applications. "Maybe by the middle of the year, the supply/demand balance is going to even out in several applications," he said. However, demand will remain strong and supply tight for chips used in automotive systems.

There may be a "little bit of easing in chip supply for automotive toward the end of the year but for most of the year, there will be shortages," said Matas.

But there should be less demand for semiconductors from computer and consumer electronics equipment manufacturers. Matas noted there was "big demand" for chips by those segments in 2020 and 2021 because many people worked and were schooled at home and many families purchased

new computers, tablets and other electronics gear. In addition, data centers also invested in new systems and semiconductor demand increased sharply.

Computer sales won't be as strong in 2022 "which will reduce growth for a lot of the chips that are used in computing," he said.

Consumer spending on electronics will not be as robust in 2022 as it was over the previous two years. "There's a little concern about consumer buying power," said Matas. Next year, with no more stimulus checks being sent by the government and with rising inflation, consumers may be a "bit more diligent about spending on some electronic products," said Matas.

"There's a lot of concern for the consumer segment in general and how much consumers will be active in the market in 2022," he said.

By the Numbers



\$1.29

The average price of an integrated circuit in 2021. Source IC Insights



17%

The forecasted increase in 200mm wafer production from 2020-2024. Source: SEMI



\$552.9 billion

The size of the worldwide semiconductor market in 2021. Source: World Semiconductor Trade Statistics



\$601.4 billion

The projected size of global semiconductor market in 2022.



8.8%:

The expected growth of the worldwide semiconductor industry in 2022. World Semiconductor Trade Statistics.



11%

The projected growth rate of semiconductor revenue and units in 2022. Source IC Insights





More capacity coming

While chip demand may slow in 2022, more semiconductor capacity will be coming online because of increases in capital spending by chipmakers in 2020 and 2021.

Semiconductor capital spending in 2021 was expected to rise 34 per cent to \$152 billion according to IC Insights. "The last time we saw a number that big was in 2017 when DRAM and NAND flash memory manufacturers were investing a lot because of the transition to 3D NAND," said Matas.

Samsung, TSMC, GlobalFoundries and Intel are making large investments in capacity. Samsung and TSMC will spend \$30 billion each on capacity expansion, according to Matas. Much of the investment will be for NAND flash and DRAM and Intel's spending will be for microprocessor capacity.

The bad news for a lot of buyers is that the capacity investment is occurring for high-end semiconductors that use the latest process technologies on 300mm wafers and not on standard, lower priced standard chips. More mature chips, such

as power semiconductors, analog, standard logic and microcontrollers, are made on 200mm or smaller size wafers and use more mature process technologies.

"I really don't think you see a big expansion industry-wide for some of the more common devices that are used across many applications," said Matas. However, there is some investment in 200mm capacity. Trade association SEMI says semiconductor manufacturers will increase 200mm fab capacity by 17 per cent from 2020 through 2024 when total 200mm wafer production will reach 6.6 million wafers per month.

Equipment spending rises

Spending on 200mm fab equipment was expected to rise from \$3 billion in 2020 to \$4 billion in 2021. By 2024 wafer manufacturers will add 22 new 200mm fabs "to help meet growing demand for 5G, automotive and Internet of Things (IoT) devices that rely on analog, power management and display driver integrated circuits (ICs), MOSFETs, microcontroller units (MCUs) and sensors," said Ajit Manocha, SEMI president and CEO.

The worldwide market for integrated circuits will post a 10 per cent compound annual growth rate through 2025 when sales will total \$656 billion. Source: IC Insights

Integrated circuit market sales rise



There is some investment by chipmakers to make analog and other standard chips on 300mm wafers. Onsemi purchased a foundry in East Fishkill, N.Y, and has started the company's first 300mm wafer production. The fab will be able to produce 20 per cent of the company's chips.

In addition, in November Texas Instruments announced it would build a 300mm fab in Sherman, Texas. Construction was expected to begin in 2022 and the fab will produce analog chips for the automotive and industrial markets. TI's future analog and embedded processing 300-mm fabs are part of the company's long-term capacity planning to continue to strengthen its manufacturing capabilities to support customer demand "in the coming decades," said Rich Templeton, TI's chairman, president and CEO.

Production from the first new fab is expected in 2025. With the option to include up to four fabs, total investment potential at the site could reach approximately \$30 billion.

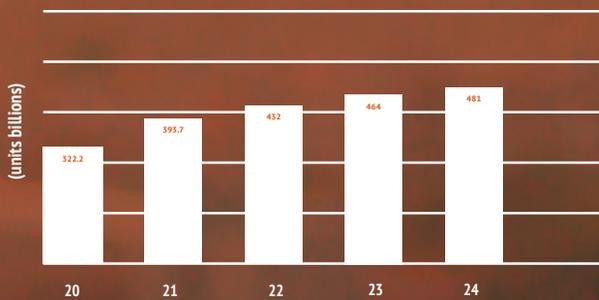
Alan Priestley, vice president analyst at researcher Gartner,

said there is actually minimal investment occurring with 200mm production capacity. "Our belief is 200mm capacity was maxed out before this all started.

It was close to maximum capacity before the pandemic," he said. While some new 300mm fabs are being built for analog and other standard chips, it is not viable for all chipmakers to convert their 200mm existing fabs to 300 mm wafer production to boost capacity, he said. The cost of doing that is prohibitive because of the high cost of equipment and mask sets for 300mm wafer production.

Chipmakers who want to increase 200mm capacity face another problem. It is difficult to find the tools needed tools to build semiconductors on 200mm wafers. "We know that the secondhand market for 200 mil tools is tight," said Priestley. "You can make a fortune for that equipment these days. In China the secondhand tool market, you are paying 10x the price of tools compared to 10 years ago," he said.

IC unit shipments push upward



Unit shipments of integrated circuits will surpass the 517 billion mark by 2025. Source: IC Insights



Forecast and procurement's 2022 Bucket List



John Denslinger is a former executive VP Murata, president SyChip Wireless, and president/CEO ECIA, the industry's trade association. His career spans 40 years in electronics

John Denslinger future gazes into 2022 and prepares a Bucket List for procurement professionals to help them handle the wave of demand about to reach shore

2022 Bucket List • By John Denslinger

From a business perspective, it all starts with a forecast and one key baseline is global GDP. According to its world economic outlook released October 2021, IMF projects global GDP at +4.9 per cent for 2022, down slightly from 2021's post-pandemic rebound of +5.9 per cent. Lingering supply chain and capacity issues are expected and will likely hamper growth throughout the first half. Not factored are the consequences of Covid variants which could derail recovery efforts. Nevertheless, 2022 should be a banner year for industry.

Demand is the second key baseline and 2022 will see tidal waves of new technology driving global markets. Most significant is the 5G roll-out, digitalization of commerce and the electrification of just about everything else, most notably EV. Beneath that layer is a booming sector expansion: 5G smart phones, smart homes, servers, computers, gaming, Industry 4.0 and a huge government infrastructure stimulant. The demand is very real and at times may overwhelm supply capability.

Drilling down to the component level, semiconductors tend to be the perennial bellwether. *WSTS* forecasts 10.1 per cent growth in 2022 on the heels of a sensational 25 per cent increase in 2021. Other forecasters seem to agree: *IC Insight* sees 13 per cent and *Semi Intelligence* reports 15 per cent growth in 2022. With respect to passives and electromechanical, the technology explosion mentioned above has a content multiplier effect further escalating total demand for these components. It would not surprise me to see passive growth exceeding 15 per cent in 2022.

Goals! We dutifully set them every new year. While 2022 is no different, setting achievable goals in procurement might be a challenge, especially when it comes to sourcing vital components. With so many out-of-the-ordinary influences hindering supply, procurement's bucket list might be oversized and overwhelming. In fairness, some factors are beyond their control: pandemic variants, trade wars, labor scarcity, regulatory interventions, etc, but the expectation remains: minimize the negative

impact. That still leaves purchasing owning plenty of actionable items. So here it is, procurement's Top 10 Bucket List for 2022:

- A manageable growth forecast
- No line downs in the factory/end of daily briefings/fewer emergency meetings with senior management
- Plentiful inventory in the channel/scheduling flexibility
- Price stability/price reductions/favorable PPVs
- Normalizing of lead times to pre-pandemic levels
- Confirmation that capacity investments are producing results up-and-down the supply chain
- Inclusion of distributor partnerships in all future supply plans
- Resumption of functioning JITs
- Clear pathways via supplier initiatives to achieve sustainability and green energy goals
- Return of face-to-face advanced technology sessions

If I were to add #11, it would be 'recognition'. You likely spent hours, day and night, on the phone expediting supply and coordinating delivery schedules with production. You kept lines running and factories open. Goods shipped to customers and demand was satisfied. Given the rosy forecast, let's hope procurement's bucket list is the reality for 2022.

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Redefining electronics logistics



**THORSTEN EYLE - DIRECTOR
LOGON AT EBV ELEKTRONIK**

In this article, EBV Elektronik's director, Thorsten Eyle, explains how the company's LogOn service helps buyers streamline complex purchasing processes

The challenges faced by the electronics distribution business over the last two years have been unlike anything previously encountered. In many cases, OEMs and ODMs have been blighted by severe component shortages and lengthening lead times. This has led to major concerns about production hold-ups and possible damage to commercial reputation.

A manufacturing facility's ability to keep pace with the market's volume expectations for the products it produces can be completely jeopardised if the required amounts of just one component cannot be sourced in time. It must be acknowledged though that OEMs/ODMs do not want to have too much capital tied up in inventory, as that limits their ability to make investments elsewhere and could leave them overexposed if strategic changes are required.

Often they must manage complex supply channels, with multiple production sites to which vast numbers of a diverse array of components must be continuously delivered. This can be a heavy workload, placing acute pressures onto overstretched purchasing and logistics staff. Rather than being burdened with the day-to-day management themselves, they are increasingly keen to offload

these activities onto a trusted third party which has the necessary expertise. This is where EBV's LogOn business unit can offer real value.

LogOn customers interact with a single point of contact (SPOC) via which they get complete visibility and constant updates. They no longer have to deal with numerous contact points at different locations or get disparate information from multiple sources. Everything is provided in a streamlined and coherent manner that facilitates the decision-making process and helps to boost efficiency. In a nutshell, they can hand over the management of their EMS partners' supply chains—thereby putting far less strain onto their own procurement departments.

Thanks to our TAM to DTAM initiative, we are offering customers the opportunity to hand over their OEM/direct business to LogOn and in return we ensure full visibility regarding backlog, POS and inventory including all EMS partners.

Peak management mechanisms can be employed to avoid line-down situations, with customers able to access buffer stock (a pre-set percentage of the annual order quantity having been stored for contingency purposes). This means they are fully prepared should unexpectedly high levels of demand be experienced.

The advanced tools used by our team enable far more accurate forecasting of future component requirements. Any prospective risks of shortages can be pinpointed and addressed before they become problematic. In addition, semi-dynamic monitoring of consumption volumes means that any alterations needed to inventory quantities can be made early on.

Through the end-of-life services we provide, our customers are better safeguarded against the potential threat of obsolescence. Long-term storage within our warehouses allows up to 10-years' worth of required components to be kept ready for shipment. All these services mean that more robust and effective supply chains can be implemented, and the difficulties that have become commonplace in this sector are fully attended to.

Last but not least, we are in the final phase of implementing a third-party logistics (3PL) model.

3PL refers to outsourcing ecommerce logistics processes to a third-party business including inventory management, warehousing and fulfilment.

www.ebv.com

Thoughts on medical software compliance and regulation

In this article the organisers of Software Design for Medical Devices summarises the results of recent research on compliance and regulatory issues

Ahead of this year's *Software Design for Medical Devices* (22 to 24 February 2022), industry experts were asked for their thoughts on compliance and regulatory issues regarding software development for medical devices.

Thirty three per cent of respondents said their biggest regulatory issue was unclear guidelines on whether certain software is regulated as a medical device or stand-alone medical device software. This is because the new Medical Device Regulation (MDR) clause leads to differing regulatory demands in different countries.

For example, a medical device might be compliant in the European Union but not in the United States.

Concern about regulatory issues scored 7/10, while forty seven per cent of respondents said their concerns included patient safety, advancement of medical device software, cybersecurity and management of patient data.

Thirty six per cent of respondents said their company's key initiatives for overcoming regulatory issues included: improving risk management; clearer product definition; hiring

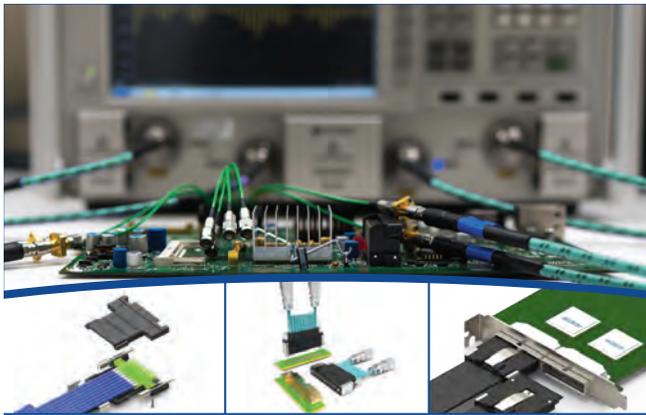
key talent with experience in medical device software development; installing new quality management software; interoperability; new software development tools and software automation.

When asked for their opinions on how compliance and regulatory issues in medical device software will impact their company's operations over the next two years, comments included:

- Large investment in processes, resources and knowledge
- Slower development and product introduction
- Increased customer expectations
- Deciding factor as to whether we stay in the medical device industry

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- Cancellation or postponement of some projects
- Development of standard best-practice solutions



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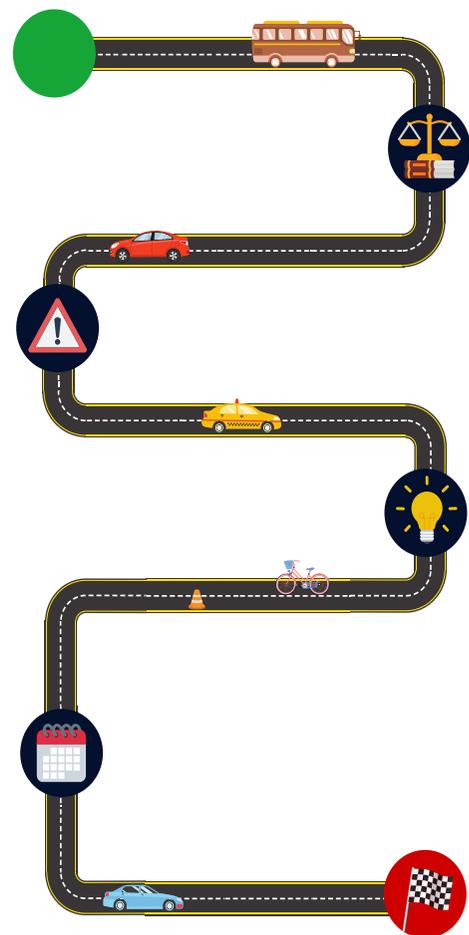
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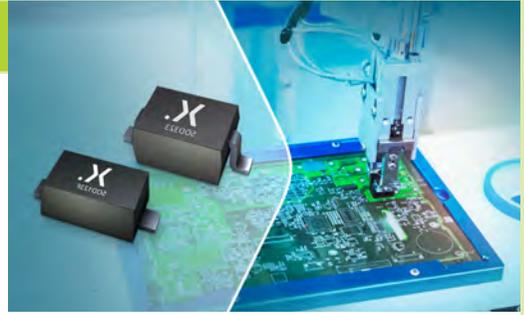
Precision voltage diodes ideal for automotive use

Nexperia has introduced a range of A-selection Zener diodes designed to meet the demands of mobile, portable/wearable, automotive and industrial applications. With a tolerance of ± 1 per cent, the BZT52H-A and BZX384-A series provide a higher precision voltage reference than the company's B and C variants.

Product manager at Nexperia, Paula Stümer, said: "Nexperia's A-selection Zener diode range covers every application from 1.8 to 75V while providing a precise voltage reference with the lowest possible tolerance. By replacing B- or C-selection devices with pad compatible A-selection Zener devices, engineers can go to the limits of the MOSFET, or choose from a wider variety of suitable MOSFETs."

A-selection Zeners are also available as Q-portfolio devices, meeting AEC-Q101 and ISO/TS16949 automotive quality standards. Q-portfolio devices offer an extended product change notification period of 180 days, rather than the standard 90 days, according to JEDEC requirements. All parts are supported with a minimum longevity of 10 years and come with a shelf-life of more than two years.

www.nexperia.com



GNSS module to reduce autonomous driving costs

Alps Alpine and Furuno Electric have jointly developed the UMSZ6 series GNSS1 module for automotive applications. It is designed to realise high-accuracy positioning to within 50 centimetres without correction data. This enables vehicle positioning down to the lane level for V2X2 applications and autonomous driving. Performance evaluations are due to begin with mass production starting in 2023.

Position accuracy in the UMSZ6 series module is achieved using a multi-frequency GNSS receiver chip based on Furuno's extended carrier aiding technology. This minimises running costs associated with correction data.

Vice president, device business, Alps Alpine, Hideo Izumi, commented: "Achieving absolute position accuracy down to the lane level is essential for both V2X applications and genuine Level 3 automated driving, but system-related costs associated with RTK technology have been an obstacle. Getting around this with a multi-frequency GNSS receiver chip based on Furuno technology will likely prove to be a breakthrough in V2X and advanced autonomous driving technology."

www.alpsalpine.com



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What's ahead for electronics distributors in 2022

Dave Doherty is president at Digi-Key Electronics. Digi-Key is both the leader and continuous innovator in the high service distribution of electronic components and automation products worldwide, providing more than 10.5 million components from over 2,000 quality name-brand manufacturers

2021 has been a whirlwind of a year, bringing both new challenges and opportunities to the high service distribution industry. Here's a look at what made this year one for the history books, how the industry addressed 2021's challenges, and what may be around the corner in 2022.

Supply & Demand Upheaval

The past year brought many challenges to the electronic components industry. While there may still be some challenging times ahead, orders will likely begin to return to more realistic levels in late 2022 as customers find more breathing room.

Even throughout these unpredictable market conditions, distributors like Digi-Key have weathered the ups and downs by continuing to invest in strategic initiatives to expand warehouse capacity, localize the customer experience both digitally and from a support standpoint, scale digital offerings and web services and expand into new markets, in order to continue serving customers around the globe with the best possible purchasing experience.

Rising to the Occasion

Suppliers in every niche of the market deserve recognition for their performance over the past year. In 2021, suppliers have gone above and beyond, identifying new, innovative ways to increase their supply and provide customers with the parts they need.

We are proud to work with suppliers who truly understand the importance of their products to the engineers and makers around the world who are creating innovative projects every day.

Digi-Key believes in a digital-first approach, and is always developing new ways to make it easier for our customers to engage digitally from anywhere around the globe, including localizing their experience in markets around the world with local language, currency and support hours, as well as fast shipping times.

Today, Digi-Key supports 26 local currencies and does business in 21 local languages – something that will continue to grow along with the business.

Looking Ahead

In many ways, the industry is cyclical – the demand and challenges from this year will likely come back around again in new forms in the future, so the key is to be better prepared with the new building blocks that were put in place over the past year.

Digi-Key has increased its investments in infrastructure and other innovations to scale capacity to keep up with skyrocketing demand, including the new Product Distribution Centre expansion in Thief River Falls, Minnesota, more robust and predictive web search functionality, Digi-Key Marketplace, higher inventory levels and increased automation in the Digi-Key warehouse, which all benefit customers by providing an easy and efficient research, shopping and delivery experience.

These investments have helped Digi-Key, its suppliers and customers weather the storm of 2021, and leaves all parties well positioned for 2022. We are looking forward to the innovation of our customers that will come in 2022, and are excited to enable the world's ideas.



Digi-Key's new Product Distribution Center expansion in Thief River Falls, Minn.



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Charging innovations enable an EV future

Avnet Silica systems engineer technical marketing, Harvey Wilson, explains how electronics innovations are driving the adoption of electric vehicles

The shift to electric vehicles (EVs) is underway. Worldwide sales reached 3.2 million units in 2020, up 65 per cent from 2019, according to Statista. This growth is attributed to factors including climate-change concerns, incentive schemes, regulatory pressure and increasing EV choice. But there are still issues limiting uptake.

Most important is range anxiety—users' concerns they will be unable to find a charger when needing one. This anxiety persists, even though many EVs have ranges of hundreds of miles and most journeys are less than ten miles. The obvious solution is to install more public charging points and this is underway.

The second concern is charging time. When filling a conventional tank, the effective energy transfer rate is measured in megawatts. However, many EV chargers only deliver energy at tens of kilowatts. Increasing the availability of high power chargers, which deliver energy at hundreds of kilowatts, will make charging more convenient. To speed up domestic charging, expect homeowners to install DC wall-boxes rather than relying on AC mains. Public chargers will tap into the grid's three-phase supply to

enable 22kW fast chargers and 43kW rapid chargers to proliferate.

EVs and chargers will also start using wide-bandgap power devices—based on either SiC or GaN technology—and matching gate drivers. These support higher voltages than silicon equivalents, so current EVs' 400V power electronics can be replaced with 800V circuits whose efficiency helps extend range.

Ease of use is also important to uptake. Expect NFC fobs for quick, easy authentication with chargers, so they can quickly find the customer's ID and vehicle details. Ease of use concerns will also drive well thought-out charger interfaces.

Putting more EVs on the road (30 million by 2030, according to the EU) will have a profound effect on the electricity grid. Tesla is already installing banks of batteries at some charging stations to maintain charging rates at busy times without overwhelming the local grid connection.

Expect more renewable energy generation at large charging sites to supplement grid supplies, and domestic micro-generation to charge EVs at home.

Managing a grid with so many more energy sources and sinks will take a combination of clever algorithms, smart chargers and rich communications. New business models are emerging to take advantage of this more distributed energy generation and distribution strategy. Again, NFC fobs will play a role in authenticating a user and their vehicle with smart chargers and the smart grids to which they are connected, so that they can pay or be paid for their energy usage.

Widespread roll-out of next-generation chargers will be critical to accelerating EV uptake. Avnet Silica already has the in-house expertise and relationships with leading suppliers to help designers enable the next generation of road transport.

avnet.com/wps/portal/silica/



Avnet Silica systems engineer technical marketing, **Harvey Wilson**



Ease of use is also important to uptake. Expect NFC fobs for quick, easy authentication with chargers, so they can quickly find the customer's ID and vehicle details

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Quick-change head extends connector life

ODU has released a quick-change head for its ODU-MAC Silver-Line connector range, extending the potential connector service life from a minimum of 100,000 mating cycles to a maximum of 10 million mating cycles.

With failure protection and numerous transmission variants, the ODU-MAC Silver-Line is specifically designed for automatic docking. With the quick-change head, the interchangeable part of the connector can be replaced with just two screws, making it ready for use again in a matter of seconds. The cable assembly on the base part remains unchanged.

Thanks to ODU Springtac contact technology, the Silver-Line also boasts excellent vibration resistance with a compact and sturdy universal design. Purchasers can choose from seven different docking frames and adjust the length as needed. Frames can then be assembled with the desired modules, using the configuration tool to simplify specification.

www.odu-connectors.com



Right angle connector targets industrial USB applications

Würth Elektronik has extended its Redcube series with new WP-SMRA surface mount solderable wire-to-board and board-to-board connections for 90deg assembly on front panels, housings, PCBs or cable connections. Available from stock with no minimum order quantity, the new WP-SMRAs are high-current contacts intended for automated assembly. An M2 screw thread version is also available for use with Würth's type-C USB jacks, providing reliable connection in industrial applications.

Connectors secured with screws against inadvertent disconnection are making a comeback in industrial applications with the USB type-C connector. Würth's M2 version of the WP-SMRA SMT-mountable connector offers an easy-to-implement solution with a reference design. Free samples are available on request.

www.we-online.com

Flexible locking system suits diverse applications



Provertha has introduced a patented locking system for D-Sub full-metal hoods, enabling purchasers to choose between different locking systems in line with application requirements. The Flexlock system offers both the conventional screw locking mechanism with knurled screw, combination slot and Allen key, as well as the Quick Lock push-pull locking system. Other locking options include the sliding lock and a locking system with insertable nut for cable-to-cable connections.

With the new Flexlock hoods, Provertha offers a D-Sub system for flexible locking at equipment interfaces and for loose cables or cable connections. The zinc die-cast enclosure is suitable for harsh environments in industrial automation and control cabinet construction, at temperatures between -55 and 90°C.

Said to be easy to assemble and exceptionally strong, Provertha's full-metal hoods offer high mechanical strength in harsh environments. The retaining spring guarantees functionality even under high loads and thanks to the pre-cut threads and pre-assembled locking accessories, the hoods are also easy to assemble.

Flexlock hoods are available as an individual packaged kit for assembly on site, however, they can also be supplied in bulk packaging for cable assembly in larger quantities.

www.provertha.com

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Buying into the latest technologies

Mouser explains how its focus on stocking the latest technologies offers a cascade of benefits for product design, purchasing, manufacturing and support

Few things are more frustrating than a delay caused by obsolete components. That's why distributors like Mouser Electronics are working hard to identify products not recommended for new designs (NRND).

Identifying product lifecycle and NRND products are two examples of value-added services beyond simple component supply. Mouser offers suggestions for component alternatives, plus the risk level for those potential replacements. In addition, it provides easy, quick access to technical data and application resources such as product datasheets, application design notes, white papers, videos and other solution-based content.

Mouser's customers can subscribe to receive product notifications online and the company offers real-time product availability through its website and customer

service representatives, providing the accurate product information to make confident buying decisions. Mouser is working with its 1,100-plus manufacturer partners to provide quick and straightforward access to the industry's newest components. Using the most advanced technology to develop cost-efficient prototypes helps limit costly redesigns, manufacturing delays or even project terminations. It also leads to a design edge by delivering more product features and capabilities, as well as longer lifecycles.

As a global authorized distributor, Mouser launches more new products than any other global distributor, with its website updated many times per day. To answer buyer's questions, Mouser's customer service and technical support staff are available weekdays from 7am to 8pm (CST) to assist with price quotes; order

placement/status; real-time product availability; technical support and more. For added service, buyers may also order and communicate with Mouser representatives via phone, email, fax and live chat.

www.mouser.com



Fulfilling customer orders



Orders are processed and shipped daily from Mouser's global distribution center in Texas



Mercury
electronics europe

Automotive Industry Approval for Mercury

Mercury has become an approved supplier to the Automotive industry, gaining approval to IATF16949. This further reinforces Mercury's commitment to longevity and ruggedness as well as design innovation in the taxing automotive component environment.

Mercury Europe provides sales, customer service, engineering expertise and market promotion in the Europe-wide market for quartz crystal product.

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www.mecxtal-europe.com



Manufacturer	Distributor	Telephone	Website	Location	Franchised Distributor	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Buffer Stock Facility
CABLE ASSEMBLY & HARNESSING												
Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,000	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	50	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,550	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
CIRCUIT PROTECTION												
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,800	N/A	0 €	N/A	50	2,500+	Y
EPCOS/TKD	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,950	N/A	0 €	N/A	50	2,500+	Y
Littelfuse	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	11,450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
ENCLOSURES												
Bud Industries	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,600	N/A	0 €	N/A	50	2,500+	Y
Hammond	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,350	N/A	0 €	N/A	50	2,500+	Y
Metcase Enclosures	OKW Enclosures	+44 (0) 1489 583858	www.metcase.com	EU	N/A	288	£40K	0 €	100%	5	22	Y
New Age Enclosures	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
FREQUENCY MANAGEMENT												
ABRACON	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
ECS	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Epson	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	900	N/A	0 €	N/A	50	2,500+	Y
IQD Frequency Products	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,500	N/A	0 €	N/A	50	2,500+	Y
Kyocera	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	950	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	550	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	N/A	50	2,500+	Y
TXC Corporation	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	N/A	50	2,500+	Y
HEATSINKS												
Aavid	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
ICs & SEMICONDUCTORS												
Alliance Memory	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	500	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Broadcom Limited	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Central Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,250	N/A	0 €	N/A	50	2,500+	Y
Cirrus Logic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Diodes Incorporated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	8,200	N/A	0 €	N/A	50	2,500+	Y
FTDI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	N/A	50	2,500+	Y
Infineon	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	8,300	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,750	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	14,050	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	24,200	N/A	0 €	N/A	50	2,500+	Y
Micron Technology	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	N/A	50	2,500+	Y
Monolithic Power Systems (MPS)	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	850	N/A	0 €	N/A	50	2,500+	Y
Nexperia	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	7,600	N/A	0 €	N/A	50	2,500+	Y
Nordic Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	60	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	N/A	50	2,500+	Y

Buyers' Guide

Manufacturer	Distributor	Telephone	Website	Location	Franchised Distributor	No. of Lines for Principle	Stock Value for Principle	Minimum Order Value	% Lead Free for Principle Range	No. of Technical Support Staff	Total No. of Staff	Buffer Stock Facility
ON Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	18,700	N/A	0 €	N/A	50	2,500+	Y
Power Integrations	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	750	N/A	0 €	N/A	50	2,500+	Y
Qorvo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	N/A	50	2,500+	Y
Renesas Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
ROHM Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
Semtech	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	350	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Skyworks	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	550	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10,050	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	39,050	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10,850	N/A	0 €	N/A	50	2,500+	Y
Xilinx	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
INTERCONNECTION												
3M	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,750	N/A	0 €	N/A	50	2,500+	Y
Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	33,200	N/A	0 €	N/A	50	2,500+	Y
Amphenol	PEI Genesis	+44 8716060	www.peigenesis.com	EU	Y	N/A	£1.3m	10 €	N/A	N/A	85	Y
Cinch Connectivity Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,250	N/A	0 €	N/A	50	2,500+	Y
FCI / Amphenol	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
HARTING	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,800	N/A	0 €	N/A	50	2,500+	Y
Harwin	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,950	N/A	0 €	N/A	50	2,500+	Y
Hirose Electric	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	7,850	N/A	0 €	N/A	50	2,500+	Y
Hirose Electric Europe B.V.		0031-(0)2 655 7460	www.hirose.com/eu	EU	Y	50,000	N/A	0 €	N/A	N/A	4,190	Y
ITT Cannon	PEI Genesis	+44 8716060	www.peigenesis.com	EU	Y	N/A	£1.3m	10 €	N/A	N/A	85	Y
JAE Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	23,600	N/A	0 €	N/A	50	2,500+	Y
ODU		+49 8631 6156-0	www.odu.de	EU, USA, ASIA			N/A	0 €	N/A	50	1,650	
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	17,150	N/A	0 €	N/A	50	2,500+	Y
Radiall	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
Samtec	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	16,300	N/A	0 €	N/A	50	2,500+	Y
Souriau	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,300	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	41,850	N/A	0 €	N/A	50	2,500+	Y
Wurth Elektronik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,650	N/A	0 €	N/A	50	2,500+	Y
OPTO ELECTRONICS												
Broadcom Limited	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
Cree, Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,800	N/A	0 €	N/A	50	2,500+	Y
Intel	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	20	N/A	0 €	N/A	50	2,500+	Y
Osram Opto Semiconductor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Toshiba	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	450	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
PASSIVES												
AVX	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	17850	N/A	0 €	N/A	50	2,500+	Y
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	15,100	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,750	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,450	N/A	0 €	N/A	50	2,500+	Y
KEMET	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	23,650	N/A	0 €	N/A	50	2,500+	Y
Kemet	RS Components	08457 201201	www.rs-components.com	EU	Y	N/A	£161m	0 €	N/A	50+	2,500	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	18700	N/A	0 €	N/A	50	2,500+	Y
Ohmite	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,550	N/A	0 €	N/A	50	2,500+	Y

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Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25,450	N/A	0 €	N/A	50	2,500+	Y
Taiyo Yuden	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,100	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	13,050	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	11,500	N/A	0 €	N/A	50	2,500+	Y
TT Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	43850	N/A	0 €	N/A	50	2,500+	Y
Würth Elektronik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,750	N/A	0 €	N/A	50	2,500+	Y
Würth Elektronik	Würth Elektronik	+49 (0) 7942 945 0	www.we-online.com	EU	Y	N/A	N/A	0 €	100%	250	4,000	Y
Yageo	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	21,450	N/A	0 €	N/A	50	2,500+	Y
POWER & BATTERIES												
RECOM Power GmbH	Various Distributor	+43 7612 88 325 700	www.recom-power.com					0 €	100%	3	560	Y
Sanyo Electronic Industries Co., Ltd.	Sanyo Electronic Industries Co., Ltd.	+81 36699 8080	www.eta.co.jp	JP	N	1,000	€3000k	20 €	90%	10	100	Y
Bel Power Solutions	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	600	N/A	0 €	N/A	50	2,500+	Y
CUI Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
MEAN WELL	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,400	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1500	N/A	0 €	N/A	50	2,500+	Y
RECOM	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,150	N/A	0 €	N/A	50	2,500+	Y
TDK-Lambda	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,900	N/A	0 €	N/A	50	2,500+	Y
TRACO Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Vicor	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,300	N/A	0 €	N/A	50	2,500+	Y
XP Power	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
SENSORS												
ams	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
Analog Devices Inc.	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	N/A	50	2,500+	Y
Bosch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,200	N/A	0 €	N/A	50	2,500+	Y
Maxim Integrated	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	350	N/A	0 €	N/A	50	2,500+	Y
NXP	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	300	N/A	0 €	N/A	50	2,500+	Y
Sensirion	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	80	N/A	0 €	N/A	50	2,500+	Y
STMicroelectronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	75	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	650	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	850	N/A	0 €	N/A	50	2,500+	Y
SWITCHES & KEYBOARDS												
Apem	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,850	N/A	0 €	N/A	50	2,500+	Y
C&K Switches	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,550	N/A	0 €	N/A	50	2,500+	Y
CHERRY	RS Components	08457 201201	www.rs-components.com	EU	Y	600	N/A	0 €	N/A	50+	3,500+	Y
E-Switch	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	2,350	N/A	0 €	N/A	50	2,500+	Y
EAO	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,800	N/A	0 €	N/A	50	2,500+	Y
Honeywell	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
NKK Switches	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,000	N/A	0 €	N/A	50	2,500+	Y
Omron	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,700	N/A	0 €	N/A	50	2,500+	Y
Panasonic	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,350	N/A	0 €	N/A	50	2,500+	Y
TERMINAL BLOCKS												
Molex	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,850	N/A	0 €	N/A	50	2,500+	Y
Phoenix Contact	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	13,550	N/A	0 €	N/A	50	2,500+	Y
TE Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,750	N/A	0 €	N/A	50	2,500+	Y

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THERMAL MANAGEMENT												
Bergquist Company	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	250	N/A	0 €	N/A	50	2,500+	Y
Delta Electronics	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	700	N/A	0 €	N/A	50	2,500+	Y
ebm-papst	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
Sanyo Denki	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,450	N/A	0 €	N/A	50	2,500+	Y
TRANSFORMERS & INDUCTORS												
Bourns	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,900	N/A	0 €	N/A	50	2,500+	Y
Coilcraft	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	5,500	N/A	0 €	N/A	50	2,500+	Y
EPCOS / TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,300	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	6,900	N/A	0 €	N/A	50	2,500+	Y
TDK	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	4,050	N/A	0 €	N/A	50	2,500+	Y
Vishay	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	1,200	N/A	0 €	N/A	50	2,500+	Y
Würth Elektronik	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	3,400	N/A	0 €	N/A	50	2,500+	Y
WIRELESS SOLUTIONS												
DIGI	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	200	N/A	0 €	N/A	50	2,500+	Y
Espressif	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	30	N/A	0 €	N/A	50	2,500+	Y
Laird Connectivity	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	100	N/A	0 €	N/A	50	2,500+	Y
Lantronix	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	25	N/A	0 €	N/A	50	2,500+	Y
Microchip	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
Murata	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	30	N/A	0 €	N/A	50	2,500+	Y
Silicon Laboratories	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	150	N/A	0 €	N/A	50	2,500+	Y
Texas Instruments	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	20	N/A	0 €	N/A	50	2,500+	Y
u-blox	Mouser Electronics	0049 (0)89 520 462 110	www.mouser.com	EU	Y	10	N/A	0 €	N/A	50	2,500+	Y

PCB Buyers' Guide

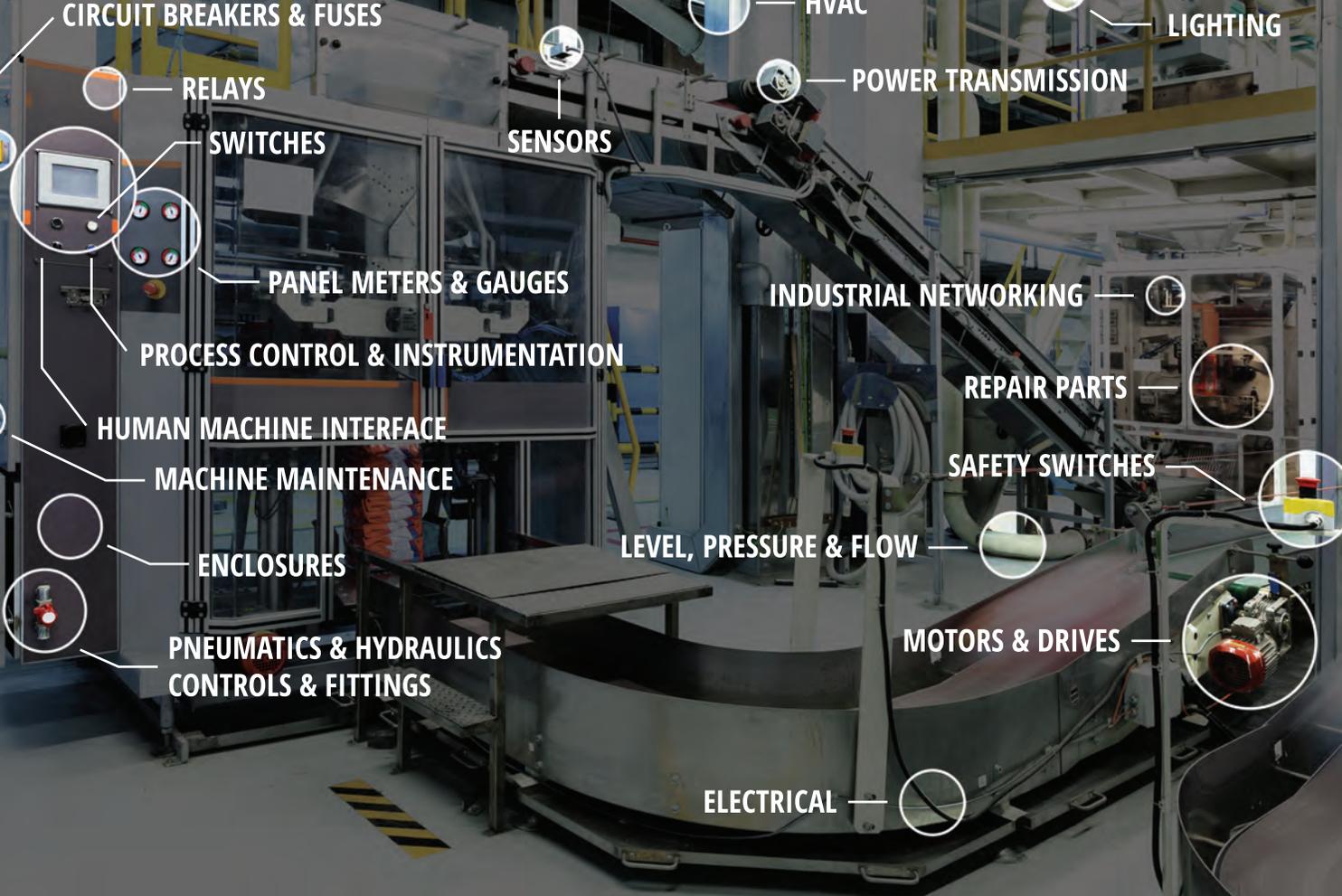
Manufacturer	Telephone	Website	Service Provided (i.e. Broker, Manufacture &/or Repair)	Location	Approvals	Volume - Small, Medium, Large	Double-sided	Multi-Layer 4-10/10-20-30	Metal PCBs	Flex / Flex-Rigid	Obsolescence Solutions	Modifications	Prototyping
Elvia PCB Group	+33 233 763 200	www.gepcb.com	M/B	France, Tunisia, China	AS9100, PRI-NADCAP, ISO-TS16949, ESA, UL, ISO9001, ISO14001	S/M/L	Y	1-30	Y	F, F/R	Y	Y	Y
Graphic Plc	00441363 774874	www.graphic.plc.uk	M	UK/China	AS9100, NADCAP, ISO 9001, AISI 4001, OHSAS 18001, MIL 31032, MIL 55110, MIL 50884	S/M/L	N	4-10	Y	Y	N	Y	Y

Contract Manufacturers Buyers' Guide

Manufacturer	Telephone	Website	Turnover	Location	Approvals	Employees	Number of Surface Mount Lines	BGA Capacity	Lead Free Manufacturer	Prototyping	Design Capability	Full Turnkey	Cables and Harnessing
AWS Electronics Group	+44 (0)1782 753200	www.awselectronicsgroup.com	£40m	UK & Slovakia	AS9100, ISO9001, 13485, 14001, TS16949, IPC-A-610 Class 3, NADCAP	430	11	Y	Y	Y	Y	Y	Y

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